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ORIGINAL ARTICLES.

ON THE INJURIOUS INFLUENCE OF THE
ACCOMMODATION UPON THE INCREASE
OF MYOPIA OF THE HIGHEST
DEGREES.

BY DR. V. FUKALA, PILSEN-CARLSBAD.

Donders, as is well known, in his work, "The Anomalies of the Refraction and Accommodation," 1866, page 351, stated that in a myopic eye of the highest degree, by the removal of the lens, an almost emmetropic condition may be gained, but that in this manner the accommodation is sacrificed. In spite of this statement of Donders, I undertook to remove the lens of juvenile myopes of the highest degree by discission, and later on, by extraction, and have published the successes gained by aphakia, together with the technique of my operation, in *Graefe's Arch. f. Oph.*, xxxvi, Th. 2, S. 23. Casey A. Wood has translated my article, and it has been published in the AMERICAN JOURNAL OF OPHTHALMOLOGY, 1890, page 347. For a long time I have studied the influence of the accommodation upon myopia of the highest degree, and especially upon its increase, and I have reached conclusions diametrically

opposite to those of Donders. Numerous authorities in ophthalmology, whose names will be mentioned in the course of this paper, agree with my opinion in every respect. This opinion is: That the loss of the power of accommodation in myopes of the highest degree is not a disadvantage, but is of considerable advantage; the use of the accommodation, according to eminent authors in our modern times, injures such eyes, in that the myopia is increased since accommodation increases the intraocular pressure. The opinion of Donders is explained by the fact that at the time when he wrote his work (1865), a true explanation of the mechanism of accommodation had only been arrived at a few years previously by Cramer; the additional changes during the act of accommodation have only been observed and studied later on. In the most recent time, only, the noxious influence of the accommodation in myopes, which increases in correspondence with the height of the degree of myopia, has, by many authors, been fully recognized.

The fact that the act of accommodation increases the intraocular pressure in the posterior portion of the eyeball was first found by Coccius (Coccius, *Anwendung des Augenspiegels*, 1853, S. 74). He bade young myopes accommodate and then suddenly look into the distance; the observer then plainly saw that the walls of the eyeball had to withstand a greater pressure during the act of accommodation than in distant vision. A year later Von Graefe made a similar observation. He wrote, in his *Archiv der Ophthalmologie*, Th. I, S. 37: "Recently, while observing the venous pulse in the retina, I had occasion to convince myself of the fact that this pulsation is increased during the act of accommodation." In Heinrich Müller's *Gesammelten und Hinterlassenen Schriften zur Anatomie und Physiologie des Auges*, Leipzig, 1852, S. 177, we read that the longitudinal fibres of the ciliary muscle produce, when contracting, an increased tension in the vitreous body. Arlt, too, wrote of increased tension in the vitreous body during accommodation (Arlt, *Ursachen und Entstehung der Kurzsichtigkeit*, 1876, p. 42).

Hensen and Voelckers were the first to explain, and to prove by experiments, how it is possible for the contents of the vitreous chamber to be put under increased pressure during the act of accommodation. It is perfectly plain from their experiments how injurious an influence must be exerted by the accommodation, especially in cases of progressive myopia and myopia of the highest degrees. It is readily understood that this portion of the posterior sclerotic, which is less resistant than the rest, will be stretched by a continuous pressure in the vitreous, and that thus the myopia must be increased.

Hensen and Voelckers, in a laborious and technically extremely difficult manner, have shown, first in dogs, then in cats, monkeys, and, finally, on the human eye, that, during every act of accommodation the choroid moves forward. (Hensen and Voelckers, *Graefe's Archive f. Ophthalmologie*, Band. xix, I Theil, S. 156). This movement causes a stretching of the blood vessels, and an exudation from the blood vessels; hence the increase of pressure in the vitreous chamber.

This explanation is universally accepted. The serous exudation during the moment of accommodation is surely not a large one; its influence, however, is summed up during long continued accommodation, and thus acts injuriously upon the less resisting portion of the posterior sclerotic. According to Mannhardt (*Bemerkungen über den Accommodationsmuskel und die Accommodation*, *Graefe's Archiv f. Ophthalmologie*, Band. iv, Theil 1, S. 282), the pressure in the vitreous body is increased during accommodation. Of very great importance for the understanding of the influence of the accommodation upon myopia are the anatomical researches of A. Iwanoff (*Beiträge zur Anatomie des Ciliar-Muskel's*, *Graefe's Archiv f. Ophthalmologie*, xv, Theil 3, S. 295). Iwanoff found that in myopic eyes the circular fibres are atrophic, while the longitudinal ones are hypertrophic. Since the circular fibres are found only in animals on a higher scale of development (monkeys), Iwanoff thinks that they are an addition in order to make accommodation easier.

Myopes use their accommodation less than hypermetropes;

therefore, the accessory portion (the circular fibres) atrophies. The atrophy once begun, and being transmitted by heredity, together with the elongated optical axis, is bound to progress. Under the influence of this condition the ciliary muscle is more and more changed into a tensor choroïdeæ, which, then, in its turn causes the pathological changes in the sclerotic and choroid. By means of its contraction the ciliary muscle of the myope must necessarily pull more forcibly on the choroid than the muscles of the hypermetrope in whose eye the circular fibres are much more developed. It is, therefore, according to Iwanoff, very probable that the sclerectasia posterior is the direct consequence of the action of the tensor choroïdeæ.

Horner was of the same opinion as Iwanoff, namely, that there is a direct connection between the accommodative effort and the progress of myopia by means of the longitudinal fibres. The only remaining fibres become hypertrophic, and during the effort of accommodation produce a series of new pathological changes in the posterior portion of the choroid and sclerotic, by which the progress of the myopia is enhanced. Even in a hypermetropic eye a certain pulling of the choroid must take place, and can, when there is great strain on the accommodation, produce an ectasia of the sclerotic, and thus a hypermetropic eye may become emmetropic or myopic (Iwanoff, *loc. cit.*, p. 298). From all this it is plain how much more likely it is for a young eye, with myopia of the highest degree and the innate tendency, to suffer from progressive myopia in consequence of the use of accommodation. Arlt fully confirmed Iwanoff's researches (*loc. cit.*, p. 5.)

I will here emphasize that Donders, also, in his work "On the Anomalies of Refraction," p. 371, writes, that myopes favor the progress of the existing staphyloma by straining their accommodation. Dobrowolsky (*Klinische Monatsbl., f. A., vi., Ausserord. Beilageheft*), Erismann (*Graefe's Archiv.* xvi, 1 Theil), Mauthner (*Optische Fehler des Auges*, 1876, S. 475, 682, 688), Schnabel (*Graefe's Archiv.*, xx, 2 Theil), Nagel (*Wie ist die Entwicklung der Kurzsichtigkeit zu verhüten?* Stuttgart,

1885), and many others, share the same opinion concerning the accommodation in myopic eyes. Practical observations all lead to the same conclusion, that when there is an inherited tendency, strain of the accommodation will bring about an increase of the myopia. Mauthner (p. 682) says: "It would be unpardonable to allow a myope of the highest degree to work with his correcting glasses, instead of giving him the correspondingly weaker concave glasses, with which he may work without using his accommodation." (P. 688) "In myopia it is our endeavor to avoid all injurious influences; we must, therefore, avoid every unnecessary strain of the accommodation; it is not permissible to allow a myope to do near work with the neutralizing glasses, since that would force him to strain his accommodation unnecessarily, and this is the very thing we want to avoid."

W. Schoen's numerous and laborious observations and articles are of considerable importance for this doctrine. In a series of papers Schoen shows, first, that strain of the accommodation causes an increase of pressure in the vitreous chamber; secondly, that by means of this strain there are gradually developed simple glaucoma, inflammatory glaucoma and senile cataract. (W. Schoen, *Der Accommodations Mechanismus und ein neues Modell zur Demonstration. Archiv f. Phys. u. Anat.*, 1887, S. 224. *Zur Ätiologie des Glaucoms, Graefe's Archiv f. Ophthal.*, xxxi, iv. Th. *Ueberanstrengung der Accommodation und deren Folgezustände. Beitrag zur Ätiologie des Glaucom's und der Aequatorial-Cataract. Archiv f. Augenheilkunde*, xvii, und *Tageblatt der 59. Vers. Deutsch. Naturf. und Ärzte in Berlin*, p. 388; *die Accommodationsueberanstrengung und deren Folgen; Ätiologie des Glaucoms und der Alterscataract. Graefe's Archiv f. Ophthal.*, xxxii, 1 Th., S. 195; Schoen, *Accommodation, Excavation und Glaucoma Simplex, Bericht. d. 7 Internat. Ophthalmologen Congresses zu Heidelberg*, S. 251; *die Ursache des Grauen Stares Archiv. f. Augenheilkunde*, 19, p. 77.) Schoen explains the longitudinal fibres and their action in the manner above mentioned. According to his idea, all excavations of the papilla, physiologi-

cal ones as well as pathological ones, must be considered as the results of an overworked accommodation. Among 76 hypermetropic, presbyopic and astigmatic individuals, Schoen found only 5 without an excavation. His researches furthermore showed that among 2800 eyes, 21.5% had excavations of medium size or even reaching to the periphery of the papilla, and that among 758 he found excavations of a high degree and reaching to the edge of the papilla in 40.3%; while according to Germann such excavations are found in only 3.6% of children under the school age. The accommodation may lead to a further peril in progressive myopia, and myopia of the highest degree, on account of the spasm of the accommodation; of course, only the spasm of a higher or the highest degree is of importance, as for instance in the two cases reported by Schnabel (*Graefe's Archiv.*, xxii, 2 Theil), in which —3 and —5 glasses were respectively worn in the presence of slight myopia and emmetropia. Similar cases are reported by Dr. Just (*Klin. Monatsbl. f. Augenheilk.*, x, p. 256); Von Reuss reports the case of a 12-year old boy who in reality had emmetropia, and wore —6 glasses. (Nagel, *Jahresbericht*, 1880, p. 535). Such a spasm of the accommodation leads to real elongation of the axis of the eyeball, and increases the existing myopia. Young myopes who have an excellent area of accommodation bring objects much nearer than is necessary, love particularly to read small print and like to do fine handiwork. Under these circumstances the myopic eye suffers greatly, since in consequence of the strain on the accommodation the degree of myopia becomes greatly increased.

We are, therefore, justified in stating that a myope of the highest degree by means of aphakia does not lose anything concerning the accommodation, but that, on the contrary, he gains to a very considerable extent, since using the accommodation increases the myopia.

THE ILL EFFECTS OF "COQUILLE" GLASSES VIZ: MINUS REFRACTION, WATER- LINES, ASTIGMATIC REFRACTION.

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The so-called "Coquille" glasses, having a watch glass contour, are much used as protectives to the eyes. Of these there is a number of grades; from those that are made by pressing the heated glass in a mold, to those, which, according to the average optician, are ground, though these latter are probably also only a better grade of pressed glass.

For years I have never permitted any patient, except those who are myopic, to wear any form or tint of coquille, because of the concave refraction and the distortion resulting from flaws in the glass, technically termed "water lines." Lately my attention has again been called to these glasses.

A young student consulted me, complaining of asthenopic symptoms. He said he had been using a pair of smoke coquilles when studying at night, on account of photophobia. Their use had seemed to aggravate rather than relieve his trouble. I carefully neutralized these divergent menisci with the following result: Refraction right glass: $-0.25s \text{ } \ominus$ $-0.25c$ axis 180° ; left glass: $-0.25s$.

Patient accepted O.D. $+0.75c$ axis 90° ; O.S. $+1.00c$ axis 90° for distance, and for reading; O.D. $+0.75s$; $\ominus +0.75$ axis 90° ; O.S. $+0.75 \text{ } \ominus$ $+1.00$ axis 90° , which gave him marked relief.

This led me to test a considerable number of coquilles, with the following results: Of 13 pairs of poorer quality, or 26

glasses, 4 pairs or 8 glasses only were devoid of cylindric refraction, all being -0.25 sphericals. Of the remaining 9 pairs the refraction of 7 pairs was concavo-cylindric on both sides (14 glasses), and of the remaining 2 pairs, one glass was a concave sphere and the other a concave cylinder. The average amount of minus cylindric effect was 0.25 D in the 14 glasses, and was remarkably regular. The angle of the axis was 115° , 80° , 90° , 60° , 15° , 180° , 105° , 75° , 10° , 160° , 130° , 180° , 90° and 11° respectively. One glass was a $-0.25os \text{C} + 0.25c$ axis 10° . All these had more or less "water lines." Of 20 pairs of better quality (40 glasses), I found 11 pairs (22 glasses) which were spherical concave, the refraction in all but one of the 22 glasses being $-0.25sD$. In three pairs the refraction of both glasses was sphero-cylindrical, and in 6 pair one glass was a minus spherical, and the other had a cylindric refraction only. The average cylindric refraction was -0.25 in the 12 glasses, but was more regular than in the poorer quality, the axis being at 120° in five glasses, 60° in two, 180° in three, and 105° and 103° once each. The refraction of one glass was $-0.50s \text{C} - 0.25c$ axis 180° .

I have been able to procure for examination only a few of the imported coquilles, which are sold at a higher price than any others in the market. Those I have tested are entirely free from water lines, but the amount of minus spherical refraction is higher than in the cheaper grades, and the average amount of cylindric effect is the same. I have tested the surfaces of these glasses by the Geneva lens measure or gauge (*Arch. of Ophthal.*, vol. xx, No. 1), and find the concave surfaces to be the segments of a sphere of shorter radius than the convex. Thus one glass gives anteriorly in the horizontal meridian $+11$. D; posteriorly in the same meridian -12.50 D; but the glass is about $\frac{1}{32}$ inch thick, and the actual difference obtained by neutralization is, therefore, only -0.50 D; they are, then, divergent menisci.

Now, it is true that the average amount of minus spherical refraction discovered and recorded above is not great, and also that the amount of astigmatic refraction is not great; but

no medical man, to put it differently, would willingly, if he could, so alter the refraction of an eye as to add to one already hyperopic even a quarter-dioptry of that refractive condition; but that is precisely what is done when the so-called coquille which is really, as shown, a divergent meniscus, is placed before such an eye. Again, a quarter-dioptry of astigmatism, even when according to rule, is looked upon as undesirable, to say nothing of axes at oblique meridians, and against the rule. In short, the best quality of coquille, even if free from cylindrical effect, can never be desirable except to a myopic eye. Moreover, as I have demonstrated, both spherical and cylindric refraction amounting to half a dioptry is not unusually found even in good grades of coquilles.

Finally, large flat smoke spectacles have all the advantages and none of the disadvantages of any coquille, save only their price, which, however, can hardly be held worthy of consideration when the interests of eyesight are involved.

CORRESPONDENCE.

PRELIMINARY CAPSULOTOMY IN THE EXTRACTION OF CATARACT.

GOVERNMENT OPHTHALMIC HOSPITAL,
MADRAS, EAST INDIES.

January 15, 1891.

EDITOR AMERICAN JOURNAL OF OPHTHALMOLOGY.—In the October number of the AMERICAN JOURNAL OF OPHTHALMOLOGY, on page 343, I notice an article entitled "Preliminary Capsulotomy in the Extraction of Cataract," by Dr. T. I. Tyner, of Austin, Texas, being a selection from the *New York Medical Journal*.

In the article referred to, Dr. Tyner says: "Owing to the great amount of literature recently devoted to the subject of cataract extraction, I owe it to you as a matter of courtesy, as well as in justice to myself, to say I would not presume to bring it forward now, had I not failed, after diligent search, to find a precedent for the operation which I shall hereafter describe, and which I believe possesses some merit."

He then proceeds to describe the operation thus: "A Bowman stop-needle is thrust into the anterior chamber—the pupil having been previously dilated—the point of which, and also the entire field of the incision, are in full view."

"The capsule is now lacerated in its upper quadrant, the line of incision corresponding to the upper pupillary curve of the iris. In this manipulation and in withdrawing the needle, the greatest care should be observed that no aqueous is lost. The eye is now practically undisturbed, and as favorable for the

corneal section as before, which should be done quickly, using a Graefe knife, preferably rather broad. When the section is finished, pressure with the flat of the blade causes the corneal opening to gape, when, at the same moment, counter-pressure with the fixing forceps below aids the expulsion, and the lens glides out through the still open pupil with surprising ease."

A little further on, in another paragraph, he proceeds to narrate the circumstances which "led up to the development of the operative procedure above described." I again quote from the article under notice: "In July, 1885, I operated on a Mexican, and while I was opening the capsule, having done an iridectomy, fluid vitreous escaped so rapidly that the globe so collapsed that the lens could only be detected by the aid of the iris forceps, having fallen into the posterior chamber. Singular to say, there was a good recovery with useful vision, which result encouraged me, a few weeks later, to attempt the extraction in the other eye. Anticipating the same condition of the vitreous, the thought suggested itself to open the capsule with a needle previous to making the corneal section. This was successfully performed, and while there was loss of vitreous (fluid), it was slight compared with the first. This case is recorded in the published statistics of Texas Surgery in 1886."

Without wishing, in any way, to depreciate the work of Dr. Tyner, and the method he has elaborated in the removal of a cataractous lens, I think it right to him and myself to mention that since the year 1879, I have operated on 3,667 cases of cataract in the manner he has described. In the year 1884, while on furlough to England, I wrote an article entitled "A Statistical Review of 1,767 Cases of Cataract," which appeared in the August number of the *Ophthalmic Review*, published in London by I. and A. Churchill, London, and by P. Blakiston, Son & Co., 1012 Walnut Street, Philadelphia. In that article I mentioned that the method of operation I had adopted recently was by laceration of the lens capsule previous to making the corneal incision. Up to the date of the publication of that

article I had performed 674 such operations, and the results, compared with other methods, are shown in the statistical tables which are embodied in that paper. Since that date I have performed 2,993 extractions of cataract by the same method with considerable success. In fact, I employ no other procedure in all forms of cataract occurring in persons above 25 years of age. I hope shortly to publish the results of all my cases of cataract operations, amounting to upwards of 5,000.

The reasons for my adoption of this method of operation are mentioned in the article in the *Ophthalmic Review*, to which I would refer your readers. By the mail which carries this letter, I also send for your acceptance a reprint of that article.

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NEWS.

EDITOR'S NOTICE.

Messers J. H. Chambers & Co. have at present in press an Oculist's Index Rerum, compiled by our esteemed collaborator, Dr. S. C. Ayres, of Cincinnati. The Index, which is complete in every respect, is herewith highly recommended to our readers. It will be placed on the market about the middle of next month.

THE NEW YORK OPHTHALMOLOGICAL SOCIETY.

The following officers have been elected for the ensuing year: President, Dr. H. S. Oppenheimer; Vice-President, Dr. J. B. Emerson; Secretary and Treasurer, Dr. John E. Weeks; Committee on Admissions, Dr. J. S. Prout, Dr. D. B. St. John Roosa, and Dr. Henry D. Noyes.

DEATH OF DR. GEORGE R. CUTTER.

The death of Dr. George R. Cutter occurred on Wednesday, the 11th inst. The deceased, who was 50 years old, was a graduate of the College of Physicians and Surgeons, of the class of 1861. He was one of the surgeons of the New York Eye and Ear Infirmary, and was the author of a German-English medical dictionary. For several years preceding his death he had lived in Brooklyn.

SOCIETY PROCEEDINGS.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, JANUARY 29, 1891.

HENRY POWER, M.B., F.R.C.S., President, in the Chair.

NOTE ON AN UNUSUAL RESULT OF CATARACT EXTRACTION.

DR. BERRY (Edinburg) gave an account of a patient, a female, æt. 72, upon whom he operated. The extraction was performed on November 27, about midday, and just at the termination of the operation an escape of decidedly fluid vitreous took place. About twelve hours later pain began, and was followed by vomiting. At 11.30 next day the dressing was distended with blood. Shortly afterwards the patient had an epileptic seizure, followed within the next three hours by two more. No further fits occurred; the patient had never previously suffered from them. Dr. Berry brought the case before the Society in reference to the relation between the intraocular hæmorrhage and the epileptic attacks. He ventured to suggest in explanation that the pressure of the blood in the eyeball caused an irritation of the intraocular sensory nerve filaments, resulting first in sickness and afterwards in a more marked nerve explosion.

MR. CRITCHETT spoke of a case of intraocular hæmorrhage coming on apparently six or eight hours after extraction of cataract, and probably induced by the reduction of tension from gradual leakage of abnormally thin vitreous.

MR. EALES mentioned a somewhat similar case, in which

the vomiting following a general anæsthetic appeared to be the cause of the bleeding.

THE PRESIDENT cited an incident in his own experience in which an epileptic seizure occurred in a patient during the operation for cataract. He was able to complete the section; and then waited till the fit had passed off to finish the operation.

ON SOME POINTS WITH REFERENCE TO THE CONNECTION
BETWEEN ACCOMMODATION AND CONVERGENCE.

DR. BERRY read this paper, in which, after admitting that the ordinary rough tests for latent deviations of the eyes afforded valuable though not very accurate information, he described the methods he had adopted for measuring these latent deviations, and ascertaining the relation between accommodation and convergence. For these tests, the results of which were given in metre angles and dioptré, he was indebted to Dr. Ernest Maddox. The experiments of Donders and Nagel had shown, in reference to the curves of relative accommodation and relative convergence, that the amount of disassociation between accommodation and convergence was subject to individual differences, could be increased by practice, and differed for varying degrees of accommodation or convergence. The amplitude of relative accommodation or convergence was greatest at the reading distance and beyond it. If the latent position of the eyes were tested, it was found that the relative divergence almost always increased with the nearness of the object of fixation. From the examination of 120 persons in reference to the latent position of the eyes in distant fixation, he had found that in emmetropia a large proportion had either perfect or nearly perfect parallelism; in myopia perfect parallelism was less frequent, and the degree of latent divergence was higher; in hypermetropia also parallelism was less frequent than in emmetropia, and latent convergence was more frequent and more considerable than latent divergence. From the examination of even this limited number of cases it became

evident that in emmetropia, and still more strikingly in ametropia, there was necessarily intimate relation between accommodation and convergence. In ametropes tested with and without correction this was very manifest. Dr. Berry showed diagrams giving the curves of relative accommodation and convergence (expressed in metre angles and dioptries) in the different conditions of refraction, and illustrated his remarks by examples from the patients he had examined.

MESSRS. HARTRIDGE and ADAMS FROST interrogated the reader of the paper in reference to the visual acuity and the age of patients examined, and spoke of the value of Maddox's test as showing that latent deviation was much more common than was generally supposed.

MINER'S NYSTAGMUS AMONG THE SOUTH WALES COLLIERS.

MR. TATHAM THOMPSON, who read this paper, first called attention to the uncertainty existing as to the causation of the disease. The two most commonly accepted causes were: First, persistent strain of ocular muscles, especially in those miners who worked lying on their sides; secondly, insufficient stimulation of retina from imperfect illumination. After calling attention to the statement so frequently made that nystagmus only occurred in those engaged in the process of "holing," where the miner lay on his side with the eyes directed obliquely upward, Mr. Thompson said that in the South Wales district there were special opportunities of judging between these two points of "position" or "illumination." The coal worked there was of two kinds—"house coal" and "steam coal." As a rule miners engaged in cutting "house coal" worked in their "seams" with very little head room, some "holing," the majority working "long wall." Safety lamps were the exception. On the other hand, the "steam coal" miner had, as a rule, six to eight feet of head room, the seams being thick; no "holing," all "long wall" work, which was done principally standing, but with much poorer illumination, owing to the necessity of using safety lamps. It was pointed out

that in the former group there were all the conditions which, according to the supporters of the "ocular muscle strain" theory, should induce nystagmus. As a matter of fact, the disease was extremely rare among the "house coal" workers, except in a few cases where safety lamps were used; whilst it was very frequently met with amongst the "steam coal" miners. Mr. Thompson had collected evidence from colliery surgeons, engineers, managers, and workman from all parts of the district, and held that the general consensus of opinion pointed emphatically to the imperfect illumination being a potent, if not the essential, factor in the causation. Several of the medical men, whose experience on the subject he had sought, had been for years in districts where "house coal" had been worked and "holing" practiced, but, who, until the "striking" of the "steam coal" and the introduction of the safety lamp, had never seen miner's nystagmus. Cases were quoted where those suffering from the disease on using the safety lamps had been relieved on going back to work with the naked light. The absence of nystagmus amongst the "laborers" and "haulers" was explained by the fact that their occupation was much more varied, as a rule with better illumination, and that much of their work was done by "feel," there being nothing like the necessity for continued strain of vision in semi-darkness. The symptoms shown were usually "dazzling," difficulty in fixation, and hemeralopia, but the writer had very rarely found vertigo, vomiting, or incoördinate movement of the extremities. In trying to induce nystagmus, attempted fixation of vision in a dark room had been found quite as effective as the oblique upward vision with the head flexed. The relation of miner's nystagmus to that induced by corneal and lenticular opacities and congenital deficiencies was considered, and the influence of imperfect stimulation of retina in both cases pointed out. Mr. Tatham Thompson went on to point out that errors of refraction, and especially hypermetropia and hypermetropic astigmatism, were very commonly met with in those suffering from miner's nystagmus; it was exceptional to find it in the emmetrope. He suggested an inquiry in this

direction as likely to prove of value. His opinion had been strongly corroborated by the evidence of Mr. G. A. Brown, of Tredegar, who had some years ago found hypermetropia to be a very constant accompaniment of nystagmus. In conclusion, he said: "I would submit that I have brought reasonable evidence to show that visual strain, with insufficient illumination, is, at any rate, as great a factor in the causation as strain of the ocular muscles; that the disease is by no means confined to those whose work is done lying down, and that errors of refraction, especially hypermetropia and hypermetropic astigmatism, are predisposing causes."

MR. SNELL (Sheffield) said that a knowledge of the working of a coal mine was very essential to the proper understanding of miner's nystagmus. He had at different times been put to some trouble by statements which on investigation proved groundless. The reader of the paper did not appear to have proved the correctness of his assertions as to the men's attitudes in the pits he mentioned, by observations made while the men were actually at work. This was to be regretted as it was important. Opinions were of no use for the elucidation of the question: facts were required. Mr. Snell referred to his own investigations, extending over many years, during which time he had endeavoured by every possible means to acquire an intimate knowledge of the manner in which miners worked. He estimated that at least five hundred cases of nystagmus had been under his treatment, and he had notes of over one hundred cases. His remarks were based on facts thus obtained. It was impossible to regard imperfect illumination (safety lamp) as the chief factor in causation, because cases occurred in miners using naked light. He mentioned cases of his own, and referred to the observations of others. The influence could only be secondary. The prime cause lay in the attitude assumed by the miners throwing their heads and eyes obliquely. "Holders" were the class prone to the disorder. They formed only a small proportion of the total workers in a pit, and it seemed to follow naturally that there was something specially prejudicial in their work. He alluded

to different facts supporting his contention, and said that the results of treatment were distinctly corroborative. Men over and over again recovered without leaving the pit if they changed their work, but became speedily worse if they returned to their old occupation. He referred to cases like this, and concluded by saying that his later observations were, decidedly corroborative of his published ones.—*Brit. Med. Jour.*

SELECTIONS FROM AMERICAN MEDICAL JOURNALS.

PAPILLITIS, OR INFLAMMATION OF THE INTRA-OCULAR END OF THE OPTIC NERVE; ITS ETIOLOGY AND CONNECTION WITH INTRA-CRANIAL DISEASE.¹

BY CHARLES STEDMAN BULL, M.D.,

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The Optic Disc or Papilla; the Intra-Ocular End of the Optic Nerve.—The intra-ocular end of the optic nerve, as seen with the ophthalmoscope, is the only nerve in the body which is visible to the eye. The nerve fibers on entering the eye radiate and spread out in and upon the retina, but not equally in all directions. They are more numerous on the nasal side, and above and below, than they are on the temporal side. The minute nutrient vessels of the disc are derived partly from the short posterior ciliary arteries and partly from the central retinal artery, twigs from both of these sources uniting to form the so-called "circle of Haller," which surrounds the optic nerve behind the disc. The nerve enters the sclerotic through a funnel-shaped opening, the wider part of which is directed backward. The central depression in the disc is called the "physiological cup" or excavation, and its size and depth are determined by the arrangement of the nerve fibers. Its color

¹Read before the New York Academy of Medicine, December 18, 1890.

is usually paler than the rest of the disc. The boundary of the disc is the "choroidal" ring, the edge of the opening in the choroid corresponding to that in the sclerotic. As the latter is the smaller of the two, a narrow rim of sclerotic is seen within the "choroidal ring," which is known as the "sclerotic ring." The trunk of the optic nerve has a double sheath. The inner sheath is delicate, closely surrounds the nerve, and is continuous with the pia mater of the brain. The outer sheath is thick, dense, fibrous tissue, which merges into the sclerotic, and at the optic foramen is continuous with the dura mater. The vaginal space surrounding the optic nerve is continuous with the subarachnoid and subdural spaces around the brain. As the nerve enters the eye, the vaginal space passes inside the posterior part of the sclerotic opening. This space is here, according to some authors, closed, while according to others it is continuous with the lymphatic spaces in the optic nerve and retina.

There are certain pathological changes occurring in the eye which are common to both optic nerve and retina. When the retina is inflamed, the optic nerve is very apt to participate in the process. But the disc also undergoes inflammatory changes independently of the retina. These pathological changes are of two kinds: increased vascularity usually associated with swelling, and diminished vascularity commonly accompanied by shrinking. The former are more or less inflammatory and are sometimes, though wrongly, classed together as "optic neuritis." In speaking of the inflammatory changes occurring in the intra-ocular end of the optic nerve I shall employ the term "papillitis," as first proposed by Leber, in order to avoid confusion.

The signs of increased vascularity or inflammation of the papilla consist usually of several more or less distinct stages:

1. There is simple congestion or abnormal vascularity, characterized by simple redness, without swelling or obscuration of the edge of the disc.
2. Congestion with œdema, slight papillitis, characterized by

redness, swelling, and more or less complete obscuration of the edge of the disc.

3. True papillitis, characterized by greatly increased redness and swelling of the disc, with total obscuration of the edge of the disc, and often of the entire disc itself.

Simple Congestion.—A few words in passing in regard to simple congestion. Increased redness is the usual symptom of tissue hyperæmia, but it is of much less value as a sign of hyperæmia of the optic disc than in the case of other tissues, on account of the great variation which may exist in the amount of normal redness. The apparent tint of the optic disc is a very frequent source of error in ophthalmoscopic examination of the eyes by unskilled observers, and its importance is greatly overestimated. It is significant only when it presents special characteristics, or when developed under repeated examinations, or when it is more pronounced in one than the other. Gowers is right when he advises that the term congestion or hyperæmia of the disc is best restricted to those cases in which the increased vascularity exists alone without any demonstrable change in the appearance or distinctness of the edge of the disc.

Papillitis.—Congestion with œdema may be regarded as the first stage of papillitis. The normal pink tint of the disc becomes increased, the edge of the disc is blurred, and there may be a more or less distinct halo surrounding it. The center of the disc may be much redder than the periphery. The vessels may be normal or the retinal veins may be enlarged. These appearances are said to be the effect of pressure on the retinal vein, causing passive congestion of the retinal vessels, but they may occur without the least sign of mechanical congestion.

From congestion with œdema to actual inflammation the transition is one of degree alone. The term "papillitis" should be restricted to those cases in which the swelling, redness and opacity are sufficient to conceal the edge of the disc. The changes here observed are due not merely to increased congestion and œdema, but to changes in the optic-nerve fibers

and surrounding nerve tissue. The different appearances on the disc in different cases, and in the same case at different times, have led to the introduction of two terms to describe different varieties of inflammation—viz., first, "descending neuritis," and second, choked disc. In true "papillitis" we have proliferation of nuclei, escape of leucocytes into the connective tissue, and finally degeneration of nerve structures. As the swelling of the disc increases, white lines and spots on the disc are not uncommonly seen, often corresponding to the position of the arteries. Hæmorrhages, usually small, are not uncommon. The arteries show little change, but the veins become dark and tortuous, and sometimes dilated. In the early stages of papillitis from tumor they are said to be less frequently dilated than in papillitis from meningitis. As the papillitis goes on, the swelling increases and often becomes so great that there may be great difficulty in seeing the disc even with a convex glass, and thus the disc becomes markedly hypermetropic. The veins are darker, more dilated, and the arteries are narrowed. Both arteries and veins may be concealed by the œdematous swelling. This swelling may invade the adjacent retina in all directions for a long distance, and occasionally white patches of exudation are seen, surrounded by small hæmorrhages. It should not be forgotten that papillitis in this stage may disappear completely. A further increase in the inflammatory process is always accompanied by signs of compression and strangulation of the papillary vessels. In this stage the arteries are very much narrowed, hæmorrhages are numerous and scattered over the entire fundus, the veins are distended and tortuous as far as the periphery, and the retina becomes more or less opaque.

An inflammation of the disc, or papillitis, may remain for weeks, or months, or even years, in the lower degrees unchanged, or the most intense strangulation of the vessels and disc may come on in a few weeks. All subjective symptoms may be entirely absent even when papillitis is present, the vision being unimpaired and the field of vision being unrestricted. Photophobia, or intolerance of light, and pain are

usually rare. In the more severe cases of papillitis the sight is always impaired and may be entirely lost. The impairment of vision usually occurs earlier in one than the other, and it may come on slowly or rapidly, but almost never suddenly. A narrowing of the field of vision usually accompanies any marked loss of vision, and very often the defect in the field is irregular. In some cases a defect in the field due to intra-cranial disease, such as hemianopsia or central scotoma, may accompany the peripheral limitation of the field due to the papillitis. This peripheral limitation is sometimes very marked. Another symptom to be carefully noted is a defect in the field for colors, and this may exist even when the vision is unimpaired. The perception for red and green is usually lost before that for yellow and blue.

The papillitis occurring in the course of intra-cranial disease may be accompanied by defective vision, due not to intra-ocular changes, but to a lesion in the course of the optic-nerve fibers or their nuclei of origin. Some authors are of the opinion that loss of vision following intra-cranial disease is more frequent in cases of descending neuritis than in cases of isolated papillitis. This may be true, but it should not be forgotten that it is an exceedingly difficult matter to distinguish ophthalmoscopically between papillitis due to descending neuritis and purely isolated papillitis.

Loss of vision from isolated papillitis never occurs suddenly, but we do meet with it occasionally from brain disease. A symmetrical hemianopsic defect in the visual field points to an intra-cranial cause; and an unsymmetrical defect, especially a loss of the temporal halves of both fields, usually indicates a pressure on the chiasm from distention of the third ventricle. Complete loss of the sight of one eye and defect of the adjacent half of the other eye are probably of cerebral origin. A peripheral narrowing of the field of vision is usually referred to a lesion in front of the chiasm.

Causes of Papillitis.—The most common cause of papillitis is intra-cranial disease; and of these intra-cranial lesions, tumor is much the most frequent. The frequency and severity of the

papillitis do not seem to be materially influenced by either the nature, the size, or the location of the tumor. The next most frequent cause is meningitis; then follow abscess of the brain, hydatid disease, and softening from thrombosis or embolism, in the order named. Papillitis is also occasionally met with in acute diseases of the spinal cord. The diseases of the general system which sometimes cause papillitis are chronic Bright's disease, certain febrile disorders, anæmia from loss of blood, etc. Papillitis may also occur as an idiopathic lesion, or from great menstrual disturbances, or from exposure to long-continued and severe cold. Unilateral papillitis is almost always due to a lesion in the corresponding orbit.

The *duration* of papillitis varies widely. It may reach its height in a few weeks and then subside, or it may be so chronic that months and even years elapse without the slightest apparent change in the ophthalmoscopic picture.

The Relation of Papillitis to Intra-Cranial Disease.—The first definite theory of the method in which intra-cranial disease acts in causing papillitis was advanced by von Graefe in 1859, and still further elaborated in 1866. It was based on certain cases of papillitis, with hæmorrhages occurring in the course of cerebral tumor, in which no signs of inflammation were demonstrable macroscopically in the trunk of the optic nerve; whereas, in certain other cases of meningitis in which the ophthalmoscopic changes had been less marked, inflammation was found in the course of the nerve trunk, and this was assumed to have descended from the inflamed meninges. This condition was called "descending neuritis" by von Graefe, who contended that the ophthalmoscopic characteristics were a slight degree of change in the color and swelling of the disc and a tendency to invade the adjacent retina. The cases of brain tumor with marked papillitis and hæmorrhages, but with no evidence of inflammation in the nerve trunks, he explained by the theory that they were due to the effect produced on the circulation of the eye by the increased intra cranial pressure, which obstructed the return of blood from the eye by compressing the cavernous sinus. This remarkable effect was

greatly intensified by the unyielding character of the sclerotic ring. To this combined swelling of the disc with hæmorrhages and vascular distention he gave the name of "*Stauungspapille*," which we translate as "choked disc."

This "obstruction" theory was accepted as more or less satisfactory until 1869, when Sesemann dealt it the first severe blow by demonstrating that the communication between the orbital and facial veins was so free that the effect of pressure on the cavernous sinus was at once relieved, and the latter caused merely a very transient engorgement of the retinal veins. He also proved that even obliteration of the cavernous sinus produced scarcely any ophthalmoscopic change in the appearance of the disc.

In 1869 Schwalbe discovered that the subvaginal space around the optic nerve is continuous at the optic foramen with the subdural spaces around the brain, and could be injected from them. These factors agreed with previous observations which had been made by Stellwag in 1856 and Manz in 1865—that the sheath of the optic nerve might be distended in optic neuritis caused by tumors and meningitis.

In 1869 Schmidt suggested that the intra-cranial pressure might influence the intra-ocular end of the optic nerve by this mechanism, since the distention of the sheath is usually greatest just behind the eyeball. This theory was supported in 1871 by Manz, who showed how frequently distention of the sheath was met with in optic neuritis, and who believed it to be an invariable occurrence in cases of intra-cranial pressure or increase of the subarachnoid fluid. He thought that the simple pressure on the nerve and blood-vessels might cause the intra-ocular changes, and he endeavored by experiments on animals to demonstrate this effect of the vaginal distention. Injections into the subdural space passed into and distended the sheath and caused engorgement of the retinal veins, and in some cases a transient redness and swelling of the papilla.

Schmidt found, however, that a colored liquid injected into the sheath passed into the lymph spaces in the nerve at the lamina cribrosa, and therefore suggested that the neuritis was produced,

not by the simple pressure outside the nerve, but by the irritating influence of the liquid which passed into these lymph spaces. These theories of Schmidt and Manz have been generally accepted, at least in Germany, as affording the most satisfactory explanation of the origin of optic neuritis.

In 1881 Leber adopted the view that the distention of the sheath is the immediate exciting cause of neuritis, but he doubted the "mechanical-pressure" theory of Manz, and rejected absolutely the "irritation" theory of Schmidt. He suggested that the fluid in the sheath excites neuritis by conveying pathogenic material to the optic nerve behind the eye, and Deutschmann, in 1887, published some experimental evidence in favor of Leber's view and in opposition to the theory of the causation of "choked disc" by distention of the nerve sheath.

In 1863 Hughlings Jackson suggested that intra-cranial tumor caused optic neuritis by its irritating effect, acting as a foreign body in the skull. This theory has been supported by Brown Séquard, and in 1868 by Benedikt; the latter ascribed the effect to irritation of the vaso-motor nerves. This theory assumes that the tumor acts in a reflex influence through the vaso-motor nerves upon the optic disc, and thus leads to its inflammation. This theory, however, has been rejected by most writers on the ground that it involves a mechanism which is not known positively to exist. It is still regarded by Hughlings Jackson, however, as the theory which best explains the phenomena of neuritis.

Edmunds and Lawford hold that optic neuritis, when due to an intra-cranial cause, is secondary to basilar meningitis, and that the inflammation reaches the substance of the nerve trunk through its sheath.

Parinaud believes that neuritis is invariably the effect of distention of the ventricles of the brain, which causes general cerebral oedema.

In our endeavors to elucidate the truth of the causation of "choked disc" or papillitis there are certain facts to be remembered. Optic neuritis, limited to or most intense in the optic

disc, may occur without any apparent intra-cranial disease. Pure papillitis is known to occur in simple anæmia. From a consideration of these facts it seems fair to conclude that the intra-ocular end of the optic nerve is a structure prone to inflammation.

It is a difficult matter to connect papillitis with increase of intra-cranial pressure, for it is the rare exception in chronic hydrocephalus, where the intra-cranial pressure is raised to the highest point of which we have any knowledge. On the other hand, in cases of intra-cranial tumor with papillitis, there may be no sign of increased intra-cranial pressure during the life of the patient. There may be signs of increased intra-cranial pressure in cases of tumor without papillitis. If we reject the theory that pressure on the cavernous sinus is the immediate cause of papillitis, still we cannot absolutely ignore its influence on the retinal circulation. The great distention of the veins and the narrowing of the arteries occur mainly when the inflammatory process has reached a high degree of intensity, and these facts point to the inflammation in the nerve as the cause of the strangulation by pressure on the vessels, and this view is confirmed by pathological investigations. The conspicuous constriction of the vessels is always in the papilla, in front of the sclerotic. Moreover, the most intense signs of strangulation may be seen in cases in which there is no reason to suspect the presence of intracranial disease. Distention of the optic sheath is frequently met with in cases of papillitis, but it is by no means invariable either in cases of tumor or in conditions of increased intracranial pressure. It may be absent in cases of cerebral tumor with papillitis. It may also be absent in cases of tumor with internal hydrocephalus.

It has been suggested that the fluid may be found within the sheath itself. If the sheath is the main lymph-channel by which fluid is conveyed from the eye, its distention in optic neuritis by fluid escaping from the papilla is easily understood. But there is good ground for believing that the fluid found in the sheath passes into it from the subarachnoid space. We

really know very little of the relation which may exist between dropsy of the sheath and optic neuritis. The occasional occurrence of papillitis without it shows that it is neither the invariable nor the chief mechanical cause of papillitis.

It, therefore, seems proper to draw the conclusion that we cannot decide in any given case against the existence of a descending neuritis from examination of a small portion of the trunk of the optic nerve, and that a pathological change in the nerve, deviating but slightly from the normal state, may convey a condition of irritation to the eye which is sufficient to set up actual papillitis.

It also seems proper to draw the following conclusions in regard to the development of papillitis in intra-cranial disease:

1. In cases of cerebral tumor, evidence of descending inflammation may be traced in the sheath or nerve much more commonly than is generally supposed, while in cases of meningitis the evidence of descending inflammation is almost invariable.

2. The resulting papillitis may be slight or may grow intense, but we are ignorant of the causes which bring about this difference.

3. The mechanical congestion in these cases of papillitis does not always result from compression of the vessels behind the sclerotic ring, but does always follow compression by inflammatory exudation in the papilla.

4. Slow increase of intra-cranial pressure has no effect on the retinal vessels, but a sudden increase of such pressure may intensify a papillitis originating in some other way.

5. Distention of the sheath alone is probably not sufficient to cause papillitis by its mechanical effect, but may intensify the process otherwise set up.

In seeking to make a diagnosis as to the cause of papillitis in a given case, we must depend largely on the presence or absence of indications of disease of the brain, or of such disease of the general organism as is known to be accompanied by optic neuritis. A high degree of papillitis with intense strangulation is seldom met with except in cases of cerebral

tumor and some forms of idiopathic papillitis. The slighter degrees of papillitis, not uncommon in cerebral tumor, chronic meningitis and other intra-cranial diseases, and the neuritis which occurs in Bright's disease, resemble each other closely. It is upon the presence of other symptoms that the diagnosis in disputed cases must rest. In considering cerebral disease as a cause, it must not be forgotten that papillitis due to a cerebral tumor may be accompanied for some time by any signs of intra-cranial disease, while on the other hand a papillitis due to some general organic disease may be accompanied by some symptoms suggestive of cerebral disease.

In *cerebral hyperæmia* there is no sufficient evidence to show that the vascularity of the disc participates in any transient cause of cerebral congestion, unless the whole head suffers. In most of the cases of long-continued vascular disturbance there are also signs of grave functional disturbance of the brain. The absence of any marked vascular alteration in the eye in cases of disturbed cerebral circulation is abundantly supported by the testimony of skilled observers.

Inflammation of the Brain.—We know nothing of any ophthalmoscopic changes in acute inflammation of the brain without meningitis. In so-called "chronic encephalitis" there may be very marked papillitis, similar to that found in cerebral tumor, due probably to the propagation of some irritative process from the brain along the nerves.

Gowers thinks that in the rare cases in which hæmorrhage or softening from embolism or thrombosis causes papillitis, the effect is probably produced through the agency of a secondary inflammation.

Hæmorrhages on the *disc* or in the *retina* are met with in a considerable number of cases of cerebral hæmorrhage. Their most frequent cause is the granular contracted kidney. They indicate the existence of conditions which favor degeneration and rupture of the vascular walls, and they are often associated with cardiac hypertrophy.

Disease of the kidney and *gout* may explain the occurrence

of papillitis when it exists alone, apart from other symptoms. Isolated double papillitis may be due to syphilis.

In *abscess of the brain*, papillitis resembling that due to cerebral tumor is often met with, but it is also frequently absent.

Tumors of the Brain.—Optic papillitis is *the* ocular lesion in intracranial growth. It is present in various degrees in a large proportion of the cases of tumor. It is not always possible to say on what the occurrence of papillitis depends. The position of the growth has apparently no direct influence on its occurrence, and the indirect influence depends upon the fact that the secondary meningitis at the base is more extensive when the tumor is not far from that part of the base. The nature of the growth does not influence the development of papillitis, for it may occur with all forms of intracranial growth. Slowly growing tumors seem to have less tendency to cause papillitis than those which grow rapidly. Hence we may conclude that intracranial tumors do not cause papillitis by the direct effect of their mass on the intracranial pressure. In most cases papillitis is a transient event in the history of a cerebral tumor, and is not a constantly associated symptom. A tumor may exist and cause symptoms of cerebral disturbance for some time, without leading to any change in the eye. Papillitis may then be developed, run its course, and end in atrophy of the nerves, while the symptoms of the tumor continue for months or even years.

The appearance of the discs in papillitis due to tumor is that of papillitis in its most typical form. It is in most cases double, but often more intense in one eye than in the other. It is probably true that the occurrence of papillitis indicates progress in the growth of the intracranial tumor. If the progress of the latter is arrested or diminished, the papillitis usually subsides and may disappear completely.

The value of papillitis as an indication of the existence of an intracranial tumor is certainly very great. It may be the only unequivocal sign of the presence of organic cerebral disease. It may also give us signs on which to base a prognosis.

A subsidence of papillitis may be regarded as indicating in most cases a retrogression of the growth, and a papillitis of very chronic course may indicate that the progress of the tumor is equally slow.

Papillitis of the usual type is frequently present in *hydatid cysts* of the brain.

The papillitis met with in *intracranial aneurysm* is probably a descending inflammation, extending to the nerve from the inflammatory process which always exists around an aneurysm.

In *simple acute meningitis* of the base papillitis may occur by direct propagation along the nerve. It is very rare in meningitis of the convexity.

In *tubercular meningitis* papillitis is very common.

Von Graefe regarded this form of nerve inflammation as a typical example of descending neuritis, the inflammation passing directly from the membranes to the optic nerves. It may, however, be a true papillitis, and is always double. The same may be said of *syphilitic meningitis* of the base, and of *traumatic meningitis*, though here papillitis is rare. *Meningitic growths* very frequently cause papillitis.

In diseases of the *cranial bones* papillitis may occur, but only as the result of meningitis and abscess. The same may be said of *injuries* to the *head*, and of *contusion* and *laceration* of the *brain*.

Diseases of the Nose and Sinuses of the Cranial and Facial Bones.—Some interesting cases have been reported in which papillitis coincided with a persistent discharge of a watery fluid from one or both nostrils. In most of these cases there were also symptoms of chronic cerebral disturbance. The most probable explanation of these cases is that there was an increased intracranial pressure as from internal hydrocephalus, and that the escape of the fluid relieved the pressure indirectly.

Diseases of the Spinal Cord.—Myelitis may be accompanied by papillitis. In *injuries to the spine* the changes in the disc are those of simple congestion with œdema.

Bright's Disease.—In the neuritic form of the intra-ocular complications of kidney disease papillitis predominates largely over the retinal changes. The arteries are usually narrow and often concealed, and there may be small white dots on the surface of the disc with hæmorrhages.

In *diabetes* changes in the fundus are rare, but there may be true papillitis, as well as retinitis with hæmorrhages. In this connection it is well to remember that papillitis and glycosuria may both be consequences of an organic cerebral disease.

Acute Anæmia from Hæmorrhage.—If the eyes of such patients are examined early in the course, signs of neuroretinitis are commonly observed, sometimes very intense. Von Graefe held that in these cases there is a retro-bulbar hæmorrhage. Ulrich considers that the papillitis in these cases is due to a disturbance in the circulation of the papilla, and he attributes the later changes to the establishment of an abnormal relation between the blood-pressure and the vitreous pressure.

In *leucocythæmia* papillitis has been met with, and in some of these eyes which have been examined microscopically, the papilla was found swollen from œdema and infiltrated with leucocytes.

Sudden suppression of the menses has not infrequently been known to cause acute papillitis, and the same has also been seen in chronic menstrual irregularities.

Papillitis, with and without hæmorrhage, has also been occasionally met with in the eruptive fevers and in malarial fevers, independently of any renal complications.—*New York Medical Journal.*

ON THE PREVENTION OF INFANTILE OPHTHALMIA.¹

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If I were to discuss the treatment and the prevention of the blenorrhœa neonatorum, I should have to repeat almost word for word what I said last year before the annual meeting at Leeds; and it will be less tiring and more expedient to distribute a reprint of my paper read on that occasion, and to make a sort of addendum to it. Not that our knowledge of the disease has undergone any great modification. That was scarcely possible, since its etiology and pathology are familiar enough to us all. Neither was there any urgent need to add to the remedies by which it may be treated. We have already a sufficient number at our disposal; and although we shall always be glad to add to our armamentarium such new names as pyoktanin, we need not forget that what we have had hitherto has proved itself thoroughly efficient.

The reason why I recur to this subject to-day is two-fold. First, it is our duty to try and prevent disease. The individual can do something to this end; but individual efforts are limited; and, to secure substantial results, combinations will be needed and State enforcements of precautions. We know how the efforts of the Committee of the Ophthalmological Society on this subject collapsed, because the resolutions which were put forward were not adopted in proper quarters;

¹Read in the Section of Ophthalmology at the Annual Meeting of the British Medical Association, held in Birmingham, July, 1890.

and the matter ended there. Distribution of cards may have been very good as far as it went, but, even if carried out, would have fallen short of the desired effect.

The possibility of the prophylaxis of the disease rests chiefly with midwives, because confinements in those classes which yield the largest percentage of blindness from this cause, are principally attended by midwives and not by medical practitioners. It is, therefore, through the instrumentality of midwives that we must hope to banish this scourge. The present time is very favorable for considering what steps ought to be taken. Of course, legislation can only help here. In Saxony, where Professor Cr  d   was the first to point out and to prove by thousands of cases the possibility of effectually preventing infantile ophthalmia, the regulations for midwives treat fully on the matter. As far back as 1882 regulations were made, and were further amplified in 1885. In Prussia less strict rules exist, but the midwives are fully instructed as to the danger of the disease, and are directed what to do.

It was, therefore, a great satisfaction to me to see that quite recently the State of New York has legislated on the matter. Through the kindness of Dr. Swan M. Burnett, of Washington, who was with us last year at Leeds (and who personally has been instrumental in bringing about this law), I am enabled to give its text. It is short and decided, and runs thus :

"Section I. Should any midwife or nurse having charge of an infant in this State notice that one or both eyes of such infant are inflamed or reddened at any time within two weeks after its birth, it shall be the duty of such midwife or nurse so having charge of such infant to report the fact in writing within six hours to the health officer or some legally qualified practitioner of medicine of the city or town, or district in which the parents of the infant reside.

"Section II. Any failure to comply with the provisions of this Act shall be punished by a fine not to exceed one hundred dollars, or imprisonment not to exceed six months, or both.

"Section III. This Act shall take effect on September 1, 1890."

Here, then, is a step in the right direction. I think it is all the more necessary for us to take some steps, as a Bill was recently brought before Parliament concerning midwives, and though shelved for six months, is likely to be heard of again.

THE EFFECT OF TERM EXAMINATIONS ON THE VISION OF SCHOOL CHILDREN.

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The system of *term examinations*, now in vogue in our schools, so frequently causes permanent injury to the eyes of the children that it is deemed of sufficient importance to bring before the readers of this magazine

In order to determine the class standing of the pupils, mid-winter and June examinations are held. This procedure calls into play the ambition of both the teachers and pupils. The former, very naturally, are anxious that the class should be able to pass the examinations creditably, since it furnishes an indication of successful teaching; while, on the other hand, the ambition of the children is excited, not only by a laudable desire to excel, but the fact that their promotion is made contingent upon their ability to pass the examination. It follows that, for a few weeks before the expected trial, teacher and pupil are prompted to extraordinary diligence in reviewing the work of the term, requiring upon the part of the children a considerable increase in the number of hours for study, thus trespassing upon the time which should be devoted to recreation or sleep. The depressing influence which such a course must exert over the general vigor of the growing child is too obvious to call for more than passing mention.

It is, however, to the baneful influence exerted upon the eyes of the children that attention is here especially directed. While it is doubtless true that the protracted strain imposed by the preparation for these term examinations falls with more

or less injurious effect upon all, it is fraught with peculiar danger to defective eyes, the percentage of which is so large in our schools that we cannot justly consign them to the operation of the harsh law of "the survival of the fittest." In discussing the hygiene of vision in our schools, we cannot neglect the important fact, now so well understood, that a very large percentage of our children enter upon their school life with congenitally defective eyes. Many of these could not escape injury under the best conceivable educational methods, and should, therefore, become the subjects of professional advice; but a large percentage of those who suffer harm under present methods would, with proper hygienic arrangements, be able to pursue their studies without injury. To this end it should be borne in mind that the injury is consequent upon the prolonged work at a near point, *e. g.*, in reading, writing, etc.

It is not the purpose in this paper to discuss the general principles of the hygiene of vision, but simply to point out the harm resulting from the spasmodic endeavor to make up in a few weeks for the deficient industry throughout an entire term. The many advantages inherent in steady and methodical application in the performance of any set task are well understood and elsewhere practiced, but too frequently neglected in the use of the eyes. The injury results from the infringement of a well-known physiological law. The eye, in common with other organs, becomes congested during the performance of its allotted function, and requires intervals of rest during which the congestion can subside. If, however, the engorgement is pressed beyond the normal limit by extraordinary occasion, or is maintained too long by continuous exertion, pathological processes are set up which impair the integrity of the highly-organized tissues of the eye. Furthermore, the anatomical peculiarities of the eye seem to render it especially liable to hyperæmia and to the resulting injury, since the increased blood supply increases the intra-ocular tension and this in turn retards the ready escape of fluids, thus producing a vicious circle, particularly harmful to the ready-yielding tissues of the

young eye. Now, the system of term examinations under discussion, prompting as it does to weeks of extraordinary and prolonged work at a near point, furnishes all the conditions needed to bring with them the vicious process here suggested.

That these theoretical considerations are of much practical importance finds frequent demonstration in the daily routine of professional work. Were it deemed desirable to cumber the pages of this magazine with the tiresome details of illustrative cases, many such might be cited from my case books, and would only demonstrate the necessity for some modification of the system of examinations now employed. I have very many times been annoyed and disappointed over the almost sudden relapse of choroidal disease, in patients under observation, often with an increase of the refraction, indicating a distention of the eye-ball, brought about by the stress of work required in preparation for the examination at the close of the school year, and this after the steady work of the term had been accomplished without harm.

For example:

Miss H., a pupil in one of our large schools, came for relief from violent asthenopia. She was a member of a family several of whom were sufferers from hypermetropic astigmatism. Her vision was reduced to $\frac{1}{v}$, due to an apparently high degree of myopia, and was associated with flannel-red eye grounds and a commencing absorption crescent at the temporal side of each disc. Under the use of a solution of the sulphate of hyoscyamine the apparent myopia disappeared, the correcting glasses being a simple concave cylinder -0.50 D. axis 180° in each eye. With this $V. = \frac{6}{v_1}$, and she was allowed to return to her work, which she pursued without harm or serious trouble until the term examination, under the strain of which her symptoms once more returned, together with the so-called spasm of the accommodation simulating myopia, which retired once more under the use of a mydriatic. This experience was three times repeated, once with an actual increase of refraction, doubtless representing a permanent expansion of the eye-ball.

This case is thus briefly sketched, without detail, simply as the representative of a large group.

Satisfactory vision is such an important factor in the educational advancement of the pupil that it should command the earnest attention of those to whom we have committed the grave responsibility of educating our children. It does not fall within the province of the physician to sit in judgment upon the relative merits of the educational methods of our schools, but I submit that in deciding upon the course to be pursued the physical well-being of the child should be seriously considered, and methods shown to be injurious either modified or abandoned.

With reference to these term examinations, I cannot refrain from suggesting, even at the cost of seeming presumption, that, in view of the great strain upon the physical endurance of the children, better results would be reached in the end by a more careful and persistent effort to fix the lessons of the term upon the mind by frequent reviews and careful teaching throughout the term, and by allowing the class standing and fitness for promotion to be determined by the marks for recitation and by the teacher's knowledge of the pupil gained by daily contact. In this I am not unmindful of the practical difficulty of securing a uniform standard for promotion, particularly in our public school system, but this should not be allowed to outweigh the too frequent serious impairment of vision and general vigor consequent upon the present method of term examinations.—*Univ. Med. Mag.*